

REMARKS

This Amendment is in response to an Office Action dated March 14, 2002. On May 21, 2002, a telephone conference was conducted between the Examiner, the named inventor Mr. Hai Bui, and the undersigned attorney. The discussion of the meeting focused on the accumulator and its distinctions with the MEMS sensor of Costin.

Applicant believes that, at least, the MEMS sensor of Costin does not describe or even suggest the accumulator as claimed. For one reason, the MEMS sensor (2mm x 2mm in size) does not describe or even suggest either fluid storage or the supply of fluid in response to an event. Yet another reason, the second chamber of the MEMS sensor (as alleged in the Office Action) constitutes an air gap between the polysilicon membrane 1200 and the silicon nitride 1300. This air gap does not operate as a chamber at all and is not in fluid (liquid and/or air) communication with a controller or pressure sensor.

I. §102(b) and §103 Rejections

Currently, claims 1, 4-6, 8, 10, 13, 16-18, 20, 21, 35, 40-50 are rejected under 35 U.S.C. § 102(b) as being anticipated or alternatively rendered obvious by U.S. Patent No. 5,733,256 (Costin) and claims 3, 7, 19, 22, 23, 34 and 37-39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Costin in view of U.S. Patent No. 5,609,576 (Voss et al.).

Applicant respectfully traverses the rejection because Costin neither describes an accumulator that comprises a first chamber with any pressurized fluid storage capability nor a second chamber in fluid communication (air or liquid) with a controller or pressure sensor as set forth in independent claims 1, 13, 37, 41, and 48. Costin teaches a MEMS sensor that is 2 mm x 2mm in size, which by its very nature does not support the storage of pressurized fluid or supply such fluid in efforts to maintain intraocular pressure of an eye. In addition,

the air gap between the polysilicon membrane 1200 and the silicon nitride 1300 should not be construed as a chamber as contended in the Office Action.

In light of the foregoing, Applicants respectfully request the Examiner to withdrawal the §§ 102(b) and 103(a) rejections and place the application in condition for allowance. If further discussion of the distinctions is warranted, the undersigned attorney respectfully requests the Examiner to contact him at his earliest convenience.

VERSION SHOWING MARKED CHANGES TO THE APPLICATION

IN THE CLAIMS

1 1. (Thrice Amended) An irrigation system for a medical device, comprising:
2 an irrigation reservoir;
3 an irrigation line coupled to said irrigation reservoir;
4 a pump coupled to said irrigation line;
5 an accumulator including a first chamber in fluid communication with said irrigation
6 line, a second chamber, and a flexible membrane that separates said first chamber from said
7 second chamber and deflects in response to a change in an amount of fluid pressure in the
8 irrigation line, said first chamber of said accumulator providing a reservoir for pressurized
9 fluid and supplying said pressurized fluid to said irrigation line in response to reduced speed
10 of said pump; and,
11 a controller including a pressure transducer in fluid communication with said second
12 chamber to detect a change of fluid pressure in said second chamber caused by the deflection
13 of the flexible membrane and to adjust a flowrate of fluid passing through said irrigation line
14 to counteract the change in the amount of fluid pressure in the irrigation line by varying a
15 speed of said pump.

1 2. Cancelled.

1 3. The irrigation system of claim 1, further comprising a valve coupled to said
2 irrigation line and said controller.

1 4. (Amended) The irrigation system of claim 1, wherein said controller activates
2 an indicator to provide a warning to replace said irrigation reservoir.

1 5. (Twice Amended) The irrigation system of claim 1, wherein said
2 controller varies said pump speed in response to a variation in the irrigation line pressure
3 sensed by said pressure transducer that rises above a desired range of pressures.

1 6. The irrigation system of claim 1, wherein said controller can determine a
2 flowrate generated by said pump.

1 7. The irrigation system of claim 6, wherein said controller determines an actual
2 fluidic resistance from the flowrate and provides an output signal if the actual fluidic
3 resistance is greater than a threshold value.

1 8. The irrigation system of claim 6, wherein said controller determines an actual
2 volume of irrigation fluid pumped by said pump from the flowrate and provides an output
3 signal if the actual volume of irrigation fluid is greater than a threshold value.

1 9. Cancelled.

1 10. Cancelled.

1 11. Cancelled.

1 12. Cancelled.

1 13. (ThriceAmended) A medical system, comprising:
2 an irrigation system that includes
3 an irrigation reservoir,
4 an irrigation pump that is coupled to said irrigation reservoir,
5 an irrigation line coupled to said pump,
6 an accumulator including a first chamber in fluid communication with said
7 irrigation line, a second chamber, and a flexible membrane that separates said first
8 chamber from said second chamber and deflects in response to a change in an amount
9 of fluid pressure in the irrigation line, said first chamber of said accumulator
10 providing a reservoir of pressurized fluid and supplying said pressurized fluid to said
11 irrigation line in response to reduced speed of said pump; and,
12 a controller including a pressure transducer in fluid communication with said
13 second chamber and to control the pressure within said irrigation line through
14 monitoring a change of fluid pressure within said second chamber of said
15 accumulator; and
16 an aspiration system that includes
17 an aspiration pump,
18 an aspiration line coupled to said aspiration pump, and
19 an aspiration pressure sensor that senses a vacuum pressure within said
20 aspiration line.

1 14. Cancelled.

1 15. Cancelled.

1 16. (Amended) The medical system of claim 13, wherein said controller
2 maintains an intraocular pressure by varying a speed of said irrigation pump and a flowrate
3 through said irrigation line.

1 17. (Thrice Amended) The medical system of claim 16, wherein said
2 controller varies said speed of said irrigation pump in response to a variation in fluid pressure
3 in said first chamber of said accumulator as sensed by said pressure transducer.

1 18. The medical system of claim 13, wherein said controller can determine a
2 flowrate generated by said irrigation pump.

1 19. The medical system of claim 18, wherein said controller determines an actual
2 fluidic resistance from the flowrate and provides an output signal if the actual fluidic
3 resistance is greater than a threshold value.

1 20. (Amended) The medical system of claim 18, wherein said controller
2 determines an actual volume of irrigation fluid pumped by said irrigation pump from the
3 flowrate and provides an output signal if the actual volume of irrigation fluid is greater than a
4 threshold value.

1 21. (Amended) The medical system of claim 19, wherein said controller provides
2 an output signal that is used to control power of a medical device that is coupled to said
3 irrigation line and said aspiration line if the actual fluidic resistance is greater than a device
4 threshold value.

1 22. (Amended) The medical system of claim 19, wherein said controller changes
2 a speed of said aspiration pump if the actual fluidic resistance is greater than a threshold
3 resistance value.

1 23. Cancelled.

1 24. Cancelled.

1 25. Cancelled.

1 26. Cancelled.

1 27. Cancelled.

1 28. Cancelled.

1 29. Cancelled.

1 30. Cancelled.

1 31. Cancelled.

1 32. Cancelled.

1 33. Cancelled.

1 34. Cancelled.

1 35. (Thrice Amended) The apparatus of claim 37 further comprising:
2 a second pressure sensor in fluid communication with the aspiration line;
3 an aspiration pump in fluid communication with the aspiration line; and,
4 a controller coupled with the first and the second pressure sensors to sense a
5 differential pressure between the irrigation line and the aspiration line and to vary a speed of
6 the irrigation pump in efforts to maintain a flow rate in the irrigation line substantially in
7 proportion to the flow rate in the aspiration line.

1 36. Cancelled.

1 37. (Twice Amended) An apparatus comprising:
2 an irrigation pump;
3 an irrigation line in fluid communication with the irrigation pump;
4 a first pressure sensor in fluid communication with the irrigation line;
5 an aspiration line; and,
6 a first accumulator located between the irrigation line and the first pressure sensor,
7 the first accumulator including a first chamber in fluid communication with the irrigation line
8 temporarily to provide stored pressurized fluid in response to dislodgment of an occlusion of
9 the aspiration line after the occlusion has already caused a substantially reduced speed of the
10 irrigation pump, a second chamber in fluid communication with the first pressure sensor and
11 a flexible membrane which separates the first and the second chamber.

1 38. The apparatus of claim 37 wherein the first accumulator is sized to maintain
2 an intraocular pressure of an eye into which the medical device is to be inserted.

1 39. The apparatus of claim 37, further comprising a second accumulator in fluid
2 communication with the second chamber.

1 40. The apparatus of claim 35, wherein the controller is further to determine that
2 an occlusion of the aspiration line has occurred if the differential pressure increases.

1 41. (Twice Amended) An irrigation system for a medical device, comprising:
2 a pump;
3 an irrigation line coupled to said pump;
4 a controller that varies a speed of said pump to adjust a flowrate of fluid passing
5 through said irrigation line; and
6 an accumulator including (i) a first chamber operating as a reservoir to store
7 pressurized fluid separately from fluid passing through said irrigation line, (ii) a second
8 chamber in fluid communication with said controller, and (iii) a flexible membrane that
9 separates said first chamber from said second chamber, said accumulator provides said
10 pressurized fluid from said first chamber to said irrigation line to maintain intraocular
11 pressure of an eye.

1 42. The irrigation system of claim 41 further comprising an irrigation reservoir
2 coupled to said irrigation line.

1 43. (Amended) The irrigation system of claim 42, wherein said pressurized fluid
2 from said first chamber is provided to said irrigation line to mitigate transit latency of fluid
3 from said irrigation reservoir.

1 44. The irrigation system of claim 41, wherein said flexible membrane of said
2 accumulator is deflected in response to a change in fluid pressure in said irrigation line and
3 causes a change in fluid pressure in said second chamber.

1 45. The irrigation system of claim 44, wherein said controller including a pressure
2 transducer in fluid communication with said second chamber to detect the change of fluid
3 pressure in said second chamber caused by deflection of said flexible membrane and to adjust
4 a flowrate of said fluid passing through said irrigation line to counteract the change in fluid
5 pressure in said irrigation line by varying the speed of said pump.

1 46. The irrigation system of claim 42, wherein said controller activates an
2 indicator to provide a warning to replace said irrigation reservoir.

1 47. Cancelled.

1 48. (Amended) An irrigation system for a medical device comprising:
2 an irrigation line;
3 a pump coupled to said irrigation line;
4 an accumulator including a first chamber in fluid communication with said irrigation
5 line, a second chamber, and a flexible membrane that separates said first chamber from said
6 second chamber and deflects in response to a change in an amount of fluid pressure in the
7 irrigation line, said first chamber of said accumulator operating as a reservoir to store fluid
8 separately from fluid passing through said irrigation line, said fluid provided from said first
9 chamber to said irrigation line to temporarily maintain intraocular pressure of an eye; and,
10 a controller including a pressure transducer in fluid communication with said second
11 chamber, said controller to detect a change of fluid pressure in said second chamber caused
12 by the deflection of the flexible membrane and to adjust a flowrate of fluid passing through

13 said irrigation line to counteract a change in the amount of fluid pressure in said irrigation
14 line by varying a speed of said pump.

1 49. The irrigation system of claim 48 further comprising an irrigation reservoir
2 coupled to said irrigation line.

1 50. The irrigation system of claim 49, wherein said fluid from said first chamber
2 is provided to said irrigation line to account for a delay of additional fluid being provided
3 from said irrigation reservoir.

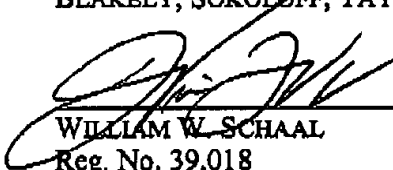
CONCLUSION

In view of the foregoing, Applicants contend that the pending claims are in condition for allowance and respectfully request the Examiner to reconsider these claims. Allowance of these claims at Examiner's earliest convenience is respectfully solicited.

Respectfully submitted,

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CERTIFICATE OF MAILING

*I hereby certify that this correspondence is being
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Date